

**ABSTRACT**

A novel process for preparing chromium dioxide of substantially high purity as well as composites of  $\text{CrO}_2/\text{Cr}_2\text{O}_3$  and  $\text{CrO}_2/\text{Cr}_2\text{O}_5$  following a sequence of simple steps. The process does not require pressure as a control parameter during the process of synthesis. No chemical modifier has been used to bring down the working pressure during synthesis. Fairly hard sintered pellets of  $\text{CrO}_2$  can be obtained without introducing any detectable impurity phase that usually appears during the process of sintering. Further,  $\text{CrO}_2/\text{Cr}_2\text{O}_3$  and  $\text{CrO}_2/\text{Cr}_2\text{O}_5$  composites have also been prepared where the fraction of insulating  $\text{Cr}_2\text{O}_3$  or  $\text{Cr}_2\text{O}_5$  in metallic  $\text{CrO}_2$  can be easily controlled. Significant negative magnetoresistance is found in pure  $\text{CrO}_2$  (5% MR) as well as  $\text{CrO}_2/\text{Cr}_2\text{O}_3$  (33% MR) composites near room temperature. The MR studies on the  $\text{CrO}_2/\text{Cr}_2\text{O}_5$  composites have been done and significant negative MR (22%) has been found in  $\text{CrO}_2/\text{Cr}_2\text{O}_5$  composites near room temperature.